

WHAT IS CLAIMED IS:

1. An apparatus for manufacturing high temperature superconducting (HTS) coils, the apparatus comprising:
two side plates disposed in facing relation;
a bobbin disposed between the side plates, the bobbin receiving layers of HTS tape interposed with a binder; and

a plurality of blocks assembled adjacent an outer edge of the side plates, the blocks being displaceable toward the bobbin to compress the layers of HTS tape on the bobbin.

2. An apparatus according to claim 1, wherein the plurality of blocks are assembled on the outer edge of the side plates via bolts.

3. An apparatus according to claim 2, wherein the bolts are sized to stepwise compress the layers of HTS tape.

4. An apparatus according to claim 2, wherein the plurality of blocks comprise blocks of different thicknesses for selective compressing according to a number of layers of the HTS tape.

5. An apparatus according to claim 2, wherein the plurality of blocks comprise a plurality of final blocks that are shaped according to desired outside dimensions of the superconducting coils.

6. An apparatus according to claim 1, wherein the binder comprises pre-preg filament-ply interlayer insulation.

7. An apparatus according to claim 1, wherein the binder comprises a thermoplastic material.

8. An apparatus according to claim 1, wherein the bobbin is racetrack shaped with substantially straight sides.

9. A method of manufacturing high temperature superconducting (HTS) coils with an apparatus including two side plates disposed in facing relation, a bobbin disposed between the side plates, and a plurality of blocks assembled adjacent an outer edge of the side plates, the blocks being displaceable toward and away from the bobbin, the method comprising:

- (a) winding HTS tape onto the bobbin;
- (b) applying a binder to the wound HTS tape;
- (c) compressing the HTS tape and the binder against the bobbin with the plurality of blocks; and
- (d) baking the compressed HTS tape and the binder to thereby cure the binder.

10. A method according to claim 9, wherein steps (a), (b) and (c) are practiced for each layer of the HTS tape.

11. A method according to claim 9, wherein steps (b) and (c) are practiced after winding multiple layers of the HTS tape.

12. A method according to claim 11, wherein step (b) is practiced by epoxy-impregnating the wound multiple layers of the HTS tape by a vacuum pressure impregnation process.

13. A method according to claim 11, wherein step (a) is practiced using HTS tape with a pre-preg coating.

14. A method according to claim 9, further comprising, prior to step (a), the step of securing a start lead of the coil to a lead terminal on one of the two side plates, and applying a binder layer to the bobbin.

15. A method according to claim 14, further comprising, prior to step (d), the step of securing a finish lead of the coil to a lead terminal on the other of the two side plates, applying a layer of copper foil to the coil with a rectangular cooling heat exchanger tube bonded thereto, and repeating step (c) under heat.

16. A method according to claim 9, wherein the bobbin is racetrack shaped with substantially straight sides, and wherein step (c) is practiced by compressing the HTS tape and the binder against the straight sides of the bobbin.

17. A method of manufacturing high temperature superconducting (HTS) coils, the method comprising:

- (a) winding HTS tape onto a bobbin;
- (b) applying a binder to the wound HTS tape;
- (c) compressing the HTS tape and the binder; and

(d) baking the compressed HTS tape and the binder to thereby cure the binder.